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PEANUT DISEASE SURVEY

The results of a survey for peanut diseases, conducted during the summer of 1931 in the Southeastern States, are summarized in the following articles.

PEANUT DISEASES IN VIRGINIA, NORTH CAROLINA, SOUTH CAROLINA, GEORGIA AND ALABAMA

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Bureau of Plant Industry.

A survey of the diseases present in the principal peanut counties of Virginia, North Carolina, South Carolina, Georgia, and Alabama was made during the period of September 12 to 28, 1931. Thousands of acres of this crop under various soil and cultural conditions were inspected. In Southwest Georgia and Southeast Alabama the White Spanish peanut is grown for commercial purposes, while the Alabama and the Virginia Runner varieties are grown for feed. In South Carolina little planting is done for commercial shipment, but the limited acreage devoted to this purpose is of the White Spanish and the Virginia Bunch varieties. In North Carolina and Virginia both the Virginia Bunch and the Virginia Runner varieties are planted on a large scale. Throughout this extended belt there are many divergent practices of planting, cultivation, harvesting, etc., which may, to a degree, affect the disease situa-

tion in any given locality. However, there are at least two diseases of considerable importance that are found fairly uniformly over the whole area. In order to present the disease situation as clearly as possible, the results of this survey are given below by States in the order in which they were inspected:

ALABAMA: Due to the limited time and to the advanced stage of the crop at the time of our inspection, only a small area was surveyed in Alabama, this being centered along the Chattahoochee River near the towns of Eufaula, Clayton, and Abbeville. A large percentage of the fields had already been harvested at this time and those not harvested were fully mature.

Leaf spot (Cercospora personata) was present in all fields, infecting 100 per cent of the plants and causing from 30 per cent defoliation in some fields to 99 per cent in others. The White Spanish variety was grown throughout this section. There seemed to be little variation in severity of the disease on different soil types, since heavy defoliations were noted on low lands, high lands, clay, sandy loam, and sandy clay loam soils within a distance of fifteen miles.

Southern blight (Sclerotium rolfsii) was present in all fields though more severe on low than on high lands. The season had been unusually dry throughout this area which may have contributed to this condition. In some fields from 1 to 2 per cent of the plants were killed by this disease although the majority showed little external evidence of infection. However, upon pulling up the plants from 1 to 30 per cent of the nuts showed rotted spots over the surface of the shell, infected pins, or a moldy growth over the mature shell.

GEORGIA: Leaf spot (Cercospora personata) was severe in the southern part of the belt, near the Florida line, causing more than 95 per cent defoliation in all fields. As we moved north the percentage of defoliation decreased to about 70 per cent at Fort Gaines, 50 per cent around Dawson and practically none north of Columbus. The commercial area of peanuts is south of Columbus but small fields were inspected near Griffin, Athens, and Hartwell and in no case was any defoliation found in the hill country. As was noticed in other States also, the severity of this disease increases toward the coast. The White Spanish variety appeared most susceptible, followed by Virginia Bunch, Virginia Runner, and Alabama Runner respectively. While the latter varieties were not free of infection or defoliation, they were considerably more resistant to the disease than the White Spanish.

Southern blight (Sclerotium rolfsii) was present in all fields but more severe in the typical sandy-loam soils. One field near Fort Gaines was found with more than a 50 per cent loss of nuts from this disease while other fields showed losses ranging from 10 to 30 per cent. In some cases as much as 5 per cent of the plants were killed while in others there was little or no trouble. One of the heaviest losses appeared to be from "pulling off" during harvest. The pins become infected thus allowing the adhering soil to pull the nut off the bush and leave it in the field.

In one field near Fort Gaines the nuts left in the field after harvest were picked up on three one-hundred square feet areas and weighed . Putting our results on an acre basis we found the loss of good nuts in this manner amounted to 231 pounds per acre. Since the average yield for the State is less than 600 pounds per acre, it is readily seen that the combined losses from this disease are considerable.

Molds (Fusaria and others) were found causing a discoloration of the shells after the vines had been stacked. The trouble was general throughout the southern part of the State. The major loss from these fungi is through the appearance of the nuts after threshing. In many cases the shells are badly discolored, thus causing the lot to be graded down by the buyer.

SOUTH CAROLINA: Leaf spot (Cercospora personata) was general throughout the Coastal Plain section of the State, causing a defoliation of about 25 per cent on the Virginia Bunch variety but little or none on the runner types. In the Piedmont section there was no defoliation of any sort and only a trace of spots on the leaves.

Southern blight (Sclerotium rolfsii) was present in all fields throughout the Coastal Plain section, causing losses of plants in some cases of 1 to 3 per cent. On the light sandy soils nut infection ran as high as 5 per cent. In the Piedmont section there was little or no nut infection although a few scattered plants were attacked.

NORTH CAROLINA: The peanut section of this State covers a broad area northeast of Rocky Mount to the coast. There are also numerous small plantings near Wilmington and in the Piedmont. The plantings are divided between the Virginia Runner and the Virginia Bunch varieties.

Leaf Spot (Cercospora personata) was causing a defoliation throughout the Coastal Plains section of about 30 per cent on Virginia Bunch and from 5 to 10 per cent on Virginia Runner. The latter invariably showed more defoliation on rich lands where there was a heavy growth than on poor lands where the growth was light. Likewise fields with poor stands had less defoliation than fields with good stands of plants. This condition suggests the importance of moisture in connection with leaf infection by this organism.

As we moved inland to the hills, we found the same decreasing amount of leaf spot infection in this State as was noticed in South Carolina and Georgia. Several fields were found west of Raleigh in which there was no defoliation and only a trace of leaf infection.

Southern blight (Sclerotium rolfsii) was general throughout the Coastal Plains sections, causing losses of from 1 to 60 per cent per cent of the plants. The average loss for the section in plants, however, is probably less than 3 per cent. The heavy losses were on the light sandy soils. Nut infection was general, probably 5 per cent of the nuts being pulled off and left in the ground during harvest. In the Piedmont there was practically no nut infection although numerous plants were observed that had been killed by this disease. The stands were very poor in the hills also, but the cause of this condition was not determined.

VIRGINIA: The peanut section of Virginia is a continuation of the area devoted to peanuts in North Carolina. The soil type is very much the same and there is little change in the varieties planted and the cultural methods practiced.

Leaf spot (Cercospora personata) was causing a defoliation of from 1 to 30 per cent throughout the entire section. Extreme dry weather had caused poor growth on the high lands in some sections while a heavy growth was noted on the low lands. In all cases of poor growth defoliation was much less pronounced than where growth was good. The average defoliation for the section was about 15 per cent.

Southern blight (Sclerotium rolfsii) was causing from 2 to 30 per cent loss of nuts on the sandy lands while on the clay lands there was only a trace of the trouble. Very few plants were killed by the organism, the principal losses being confined to the nuts. The average loss from this disease was from 5 to 10 per cent.

Summary: Leaf spot (Cercospora personata) is severe on peanuts in the Coastal Plain section of the Southeast. Defoliation decreases from the coast inland, becoming of no importance in the Piedmont.

Southern blight (Sclerotium rolfsii) is general throughout the peanut belt of the Southeast but is more severe on the sandy lands than on the clay lands. The principal damage done by this organism is in causing nuts to pull off during harvest, causing discolored shells, and producing inferior stock known as "pickouts."

A PLANT DISEASE SURVEY OF PEANUTS IN GEORGIA

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With the cooperation of the Plant Disease Survey of the Bureau of Plant Industry, United States Department of Agriculture, surveys throughout the peanut region of southwest Georgia were made in late June, early August, and again in early September at digging time. Also specimens of diseased peanut plants were sent the writer each week during the growing season by Mr. Bob Barry and by many of the County Agents.

Most of the peanuts are grown in the Southwest corner of the State beginning just below Columbus, running east to Hawkinsville, and then Southwest to Albany, Bainbridge, and the Alabama line. In 1929, 111,825 tons were produced on 343,000 acres, while in 1930 this was decreased to 99,280 tons on 292,000 acres. The average yield for the State for the period from 1919 to 1930 inclusive was 698 pounds per acre. Most of the marketable peanuts are of the White Spanish variety, while those grown for hogs, not included in the above estimate, are Georgia or Alabama Runners. The large peanut, or Virginia type, has not been successfully grown here.

Diseases in Summer of 1931

Weather conditions were not favorable to either peanuts or the diseases. The early season was very dry and hot, with few rains in July followed by a drought in most of August and September.

Leaf spot (Cercospora personata) was very general, occurring over the entire belt, but it did not become serious until early in August. During June practically none was seen in the eastern counties, and only a trace in the southwestern counties and in Alabama along the Chattahoochee River. In early August infection was low in the eastern and northern edges of the belt, but in the river bottoms across from Fort Gaines, the disease had caused 80 per cent defoliation. Just before harvesting in September the spotting was very heavy in Early and Clay counties. Most of the leaves in every field inspected showed the spots, and there was so much defoliation that in many fields the stems were bare. This Cercospora then must have caused considerable injury, but it is general every year that it is impossible to estimate probable loss percentages. Alabama Runners appear more resistant than the Spanish.

Wilt caused by Fusarium martii phaseoli was found chiefly in Clay and Early counties with traces in counties adjoining these on the east and north, and none in the eastern part of the State. It appeared in June and reduced the stand from 10 to 38 per cent in fields in the above two counties. At this time the weather was extremely dry, the plants were small, and there were very few upper lateral roots or pins. The tap roots were attacked and the plants turned yellow and died quickly. Later in July when the rains began this wilting stopped.

The organism was grown in cultures, and wilt was produced experimentally in the greenhouse on peanuts grown under practically sterile conditions. Mature plants in the field are not particularly injured by the Fusarium, and it appears to be serious only to young plants especially in dry weather. Determination of the fungus was made by Dr. Sherbakoff. This disease was found on stiff brown land as well as on sandy loams. No differences in varietal susceptibility were observed.

Wilt or Yellows caused by Bacterium solanacearum was confined to the same region as the Fusarium wilt, in fact, this species was isolated from many plants which had decayed roots harboring the Fusarium. An outright wilt is produced only in very young plants. In older plants bacterial lesions are found on lower parts of stems and roots, followed by a yellowing of tops and diminution of peanuts produced, but no actual wilt. Plants so affected are easily attacked by several very weak parasites. The symptoms were confused because of the presence of other fungi. Pure cultures were made of all possible pathogenes and inoculations were made from these on plants in the laboratory and in the field.

Around Blakeley and Fort Gaines during the brief wet period in July stems attacked by the bacteria were found covered with pycnidia of Diplodia natalensis. This attack disappeared in the following dry weather, and in September none could be found except on quite dead parts lying around in the fields.

During late August and September, B. solanacearum was isolated from diseased plants from Mitchell, Lee, Dougherty, Baker, Calhoun, Randolph, and Stewart, as well as Early and Clay Counties. A few fields outside of this area were found with the disease. One thirty acre plot, eight miles Southwest of Oglethorpe, showed yellow spots composed of heavily infected plants. Here the bacteria were the only causal organisms. Infected plants were yellow, dwarfed, and bore few peanuts. Peanut plants on this compost were most seriously affected.

At the Experiment Farm at Fort Gaines, White Spanish appeared most susceptible, Virginia Bunch next, and Virginia Runner and Alabama Runner least affected. This disease was found on heavy clay as well as on sandy lands.

Stem-blight and Peanut Rot due to Sclerotium rolfsii. This organism appeared first after the rains in July, and from then on increased steadily until its maximum effect was seen at harvesting time. There was no one region in which it was epidemic, but isolated fields or parts of fields throughout the peanut belt suffered severely. Traces were found in fields from Hawkinsville to Vienna and down to Colquitt and around Fort Gaines in early August. During September it was found in many fields that had not previously been affected. Near Reynolds about 5 acres of a 25-acre field were infected. Whole plants were not blighted, but dead branches were seen scattered throughout, and fully 70 per cent of the plants when pulled up showed rotten peanuts and decayed roots. These were White Spanish.

At Fort Gaines in the Experiment Farm peanuts were planted on the same plot as last year. An experiment was conducted to determine the value of sulfur and copper sulfate in checking Sclerotium rolfsii as well as the other diseases. These were applied in the row at planting time on part, and later as a dust on other rows. The varieties used were those mentioned above. No differences in amount of disease could be observed at harvesting time between treated rows and checks. The White Spanish appeared most susceptible, Virginia Bunch next, and Alabama and Virginia Runners appeared more resistant. However, in this field the latter two varieties did not show a great deal of resistance. The yield of Spanish was decreased from 1305 pounds per acre last year to about 300 pounds of marketable peanuts this year. The writer examined all the plants in 10 rows, taken through the center of the field, during the harvesting, and could find not a single plant free from the Sclerotium or from Bacterium solanacearum. The soil in most of this field is a sandy loam.

In a 60-acre field just across the road Sclerotium rolfsii was also heavy, with many rotten peanuts. The loss here was about 50 per cent. S. rolfsii and B. solanacearum were also found in another small field that had not been in cultivation for three years.

The extremely dry weather in the late season was not considered favorable for the development of Sclerotium rolfsii, but in spite of that the injury was more severe than last year, which was wet at this period. The effect of the drought seemed to be to make the fungus go deeper in the ground, with less noticeable results on the tops, but much rot of peanuts and roots.

In the plats of the Agronomy Division at Athens, one acre was planted to 75 varieties of peanuts. This plat developed blight in early August. Here the White Spanish were heavily attacked, while the Runner types were practically immune.

Summary: Leaf spot caused by Cercospora personata was the most widespread disease of peanuts in Georgia in 1931. It is most serious in low lands, and its extent appears to be correlated with the humidity.

Fusarium martii phaseoli is capable of producing a seedling wilt, or wilt of young plants during a drought, when there is very little root development. It decreased the stand in a limited area.

Bacterium solanacearum produced root rot followed by wilt during drought when plants are young, and on mature plants lesions on roots and lower parts of stems. The xylem of such stems is stained brown, with many occluded vessels and brown spots in pith. Such plants turn yellow and bear very few nuts if the attack is serious. This was found in scattering fields throughout the peanut belt.

Sclerotium rolfsii produces a plant blight, root rot, and peanut rot. Plant destruction is most serious when it follows attacks of B. solanacearum. This year it developed late in the growing season. It was found more commonly on very sandy lands and in low parts of fields. It was found in isolated fields scattered throughout the peanut region and was not in the nature of an epidemic this year.

The Alabama Runners appeared to be most resistant to the above diseases and the White Spanish most susceptible.

PEANUT DISEASE SURVEY OF VIRGINIA AND NORTH CAROLINA

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Bureau of Plant Industry

A survey of the peanut disease situation in southeast Virginia and northeast North Carolina was made during the period October 3 to 15, 1931. Fourteen peanut factories were visited for the purpose of finding out the percentage of diseased and damaged peanuts which have to be picked out by hand, and put into a lower grade, or sold for stock feed.

As the greater part of the crop had been harvested at this time, three ten-square-foot plots were selected at random in representative fields, and all the peanuts remaining in the ground were dug and weighed, after which an estimate of the percentage of rotten nuts was made (see field notes in table). The Virginia Bunch and Virginia Runner varieties dominate this region, and are apparently planted in about equal proportions. Observations were made on as many divergent types of soil, fertilizer treatments, and rotation practices as possible.

The results of this survey are given in tabular form.

Table 6. Factory notes on 1930 crop and field notes for 1931 crop of peanuts in Virginia and North Carolina.

Location of Factory	Factory Notes 1930 Crop	Field Notes for 1931 Crop - 300 square feet.
NORTH CAROLINA		
Edenton	2% "Pick Outs"	(1) 6 lbs. 10% rotten heavy clay (2) 11 1/4 lbs. 90% rotten sandy soil (3) 9 3/4 lbs. 90% rotten field following sweet-potatoes fertilized and limed. (4) 3 3/4 lbs. 30% rotten across the road from (3) but not fertilized or limed.
Williamston	2% "Pick Outs"	(1) Three circular areas of about 20 feet diameter were rotted in a 20-acre field, where all the tops of the plants had died down. All of the peas were rotten in these areas. Farmer said lime had been unloaded here.
Plymouth	6% "Pick Outs" Had to increase force to take care of 1930 crop.	Leaf spot had entirely defoliated a 20-acre field. Very little rot found.
Ahoski	2% "Pick Outs"	Very little root rot was found except in the higher lighter soils.
VIRGINIA		
Suffolk	4% "Pick Outs" "Raisins" gave most trouble	(1) 7 lbs. 70% rotten Peas were dug from 300 sq. ft. from field where mole cricket had been reported as doing the damage. (Limed very heavily).

*See Page 173.

Location of Factory	Factory Notes 1930 Crop	Field Notes for 1931 Crop - 300 square feet
VIRGINIA		
Suffolk	3/4% "Pick Outs"	(2) A nearby field which had not been limed contained only a trace of rot
Suffolk	3.5% "Pick Outs"	
Suffolk	The amount of "Pick Outs" was double on average year, mostly due to "saps" or "raisins".	
Franklin	5% "saps 1.5% "Pick Outs"	
Boykins	2% "Pick Outs"	2 lbs. 2% rotten peanuts were dug from 300 sq.ft. heavy clay soil.
Emporia	2% "Pick Outs" in Spanish Variety 5% "saps" in Va	90% defoliation was noted in a 20 acre field of Spanish peanuts. No root rot was found in a 300 sq. ft. plot. Heavy soil.
Petersburg		8 lbs. 70% rotten peas were dug from 300 sq. ft. Spanish variety, sandy soil, with a heavy application of lime.
	The amount of "Pick Outs" and "saps" increased four times in 1930.	
Stoney Creek	10% "raisins" last year.	(1) 3 lbs. of 70% rotted peanuts were dug from 300 sq. ft. Light, sandy soil. No rot was found in the same size area of clay soil near (1).

*"Raisins" or "Saps" - are trade terms applied to small leathery, hard, undeveloped nuts resembling raisins in color and appearance. They are believed by growers to be formed on secondary growth following showers just before harvest.

Summary: The percentage of "pick outs" obtained from the 1930 crop ranged from 0.75 per cent to 10 per cent, which is reported as a considerable increase over previous years. To what extent this increase is due to diseases or to the drought of 1930 can not be determined.

An increase of rotten peas was apparent in light sandy soils, and in fields where fertilizer or lime had been applied.

No noticeable varietal difference in reaction to the "root rot" could be determined.